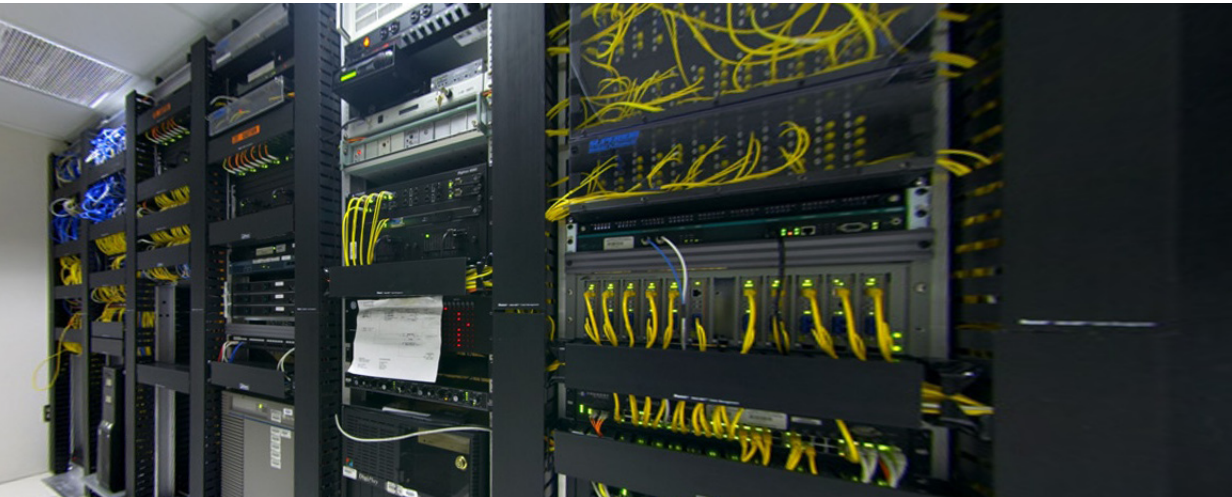


Product Brief:

Ethernet Operations Administration & Maintenance

Revision - EOAM 2.0



Product Overview:

Ethernet Operations Administration & Maintenance [EOAM] is a suite of protocols for monitoring and troubleshooting of Ethernet networks and Ethernet WANs. The standard mechanisms for performance measurement and fault detection provided by EOAM are a key requirement for deployment of Carrier-class Ethernet.

Asidua's EOAM software stacks have been developed in partnership with Wintegra to build on the capabilities of the WinPath family of network processors to present a fully functional, integrated solution.

Asidua have developed three standards-compliant stacks:

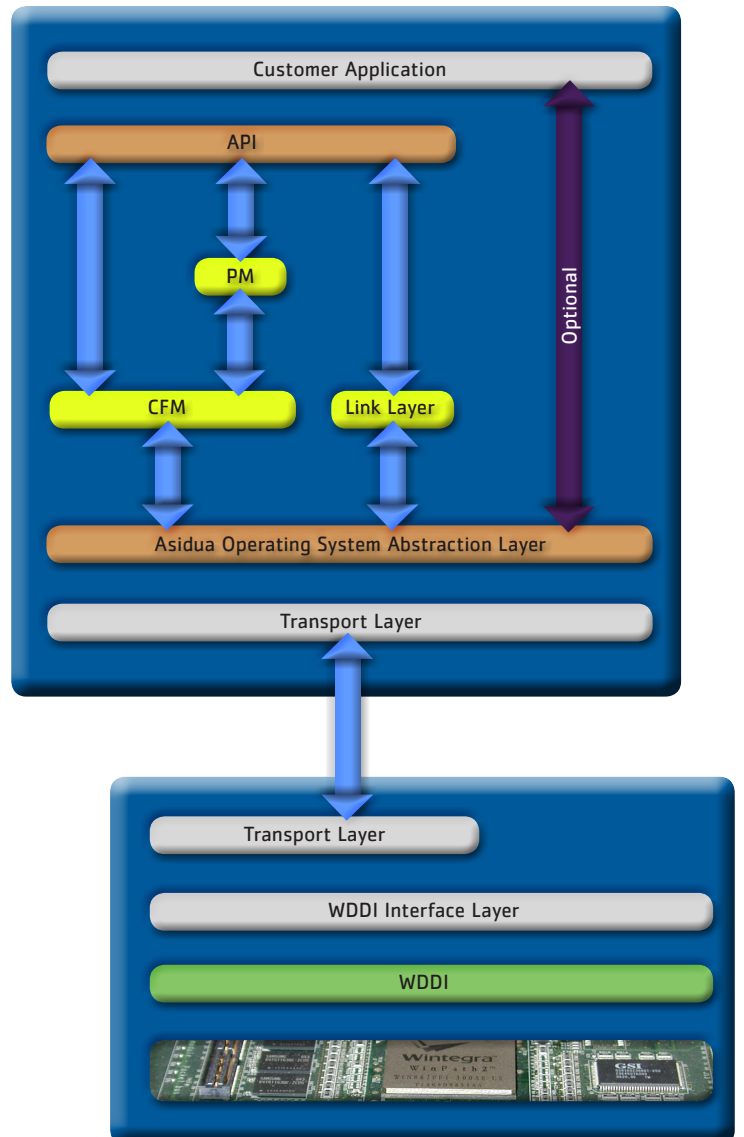
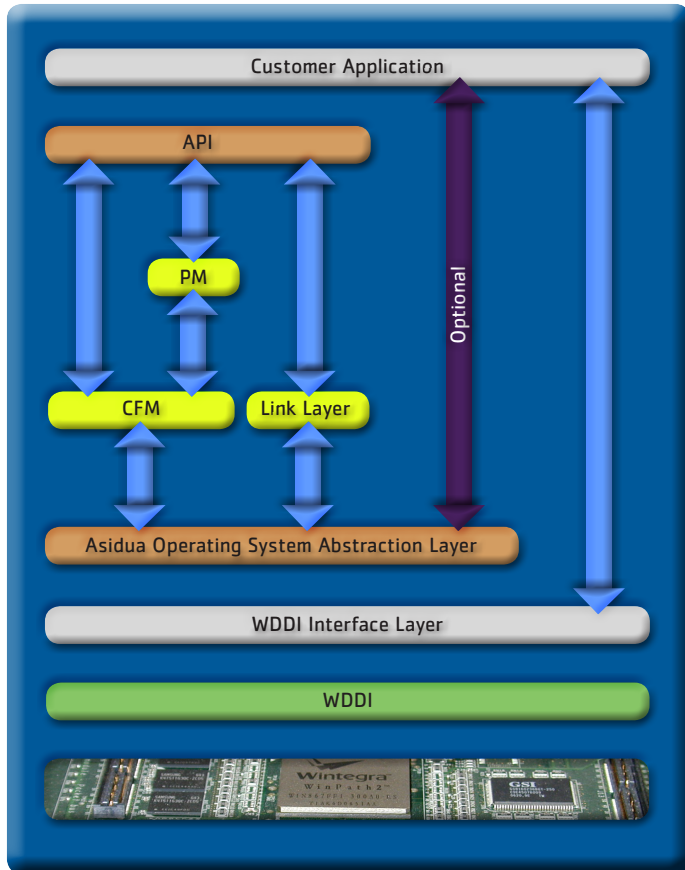
- Connectivity Fault Management - CFM [IEEE 802.1ag]
- Performance Monitoring - PM [ITU-T Y.1731]
- Link OAM [IEEE 802.3ah]

Features:

- Integrated support for WDDI API allowing deployment on any applicable WinPath variant.
- End-to-end network connectivity verification [CFM]
- Management of Service Level Agreements using frame loss and delay measurement [PM]
- Monitoring of Ethernet First Mile link status [LinkOAM]
- Operating System independent
- Portable ANSI 'C' code implementation
- Delivered with comprehensive documentation and example application

Ethernet OAM:

Standards IEEE 802.1ag [CFM]
ITU-T Y.1731 [PM]
IEEE 802.3ah [Link OAM]



Licensing:

The licensing model for the EOAM software stacks is designed for ease of use and integration with customers' development platforms.

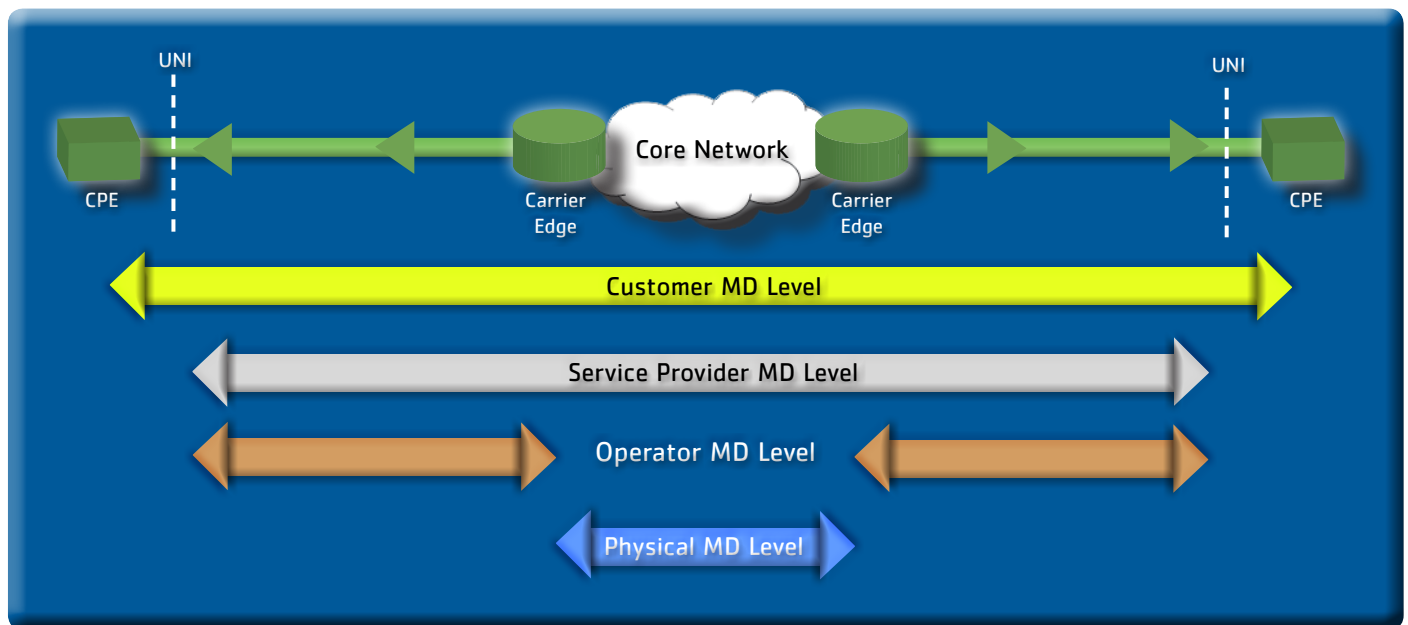
A one-off fee per stack provides the licensee with full source code and the right to use that stack on one product.

Deliverables:

- Source code
- Build environment
- Detailed API documentation
- WDDI Reference Application [showcases the use of the software stack]
- User guide

Connectivity Fault Management:

CFM [defined in IEEE 802.1ag] allows verification of end-to-end network operation at multiple service levels, as shown below.



The three major building blocks of CFM are:

- Continuity Check – provides proactive service verification using periodic exchange of heartbeat messages between peers.
- Loopback – Layer 2 ‘ping’ equivalent
- Link Trace – Layer 2 ‘traceroute’ equivalent

Technical Specification [CFM]

Maintenance Domain Levels Supported	0-7
Maintenance Associations [MAs] Supported	Configurable [Up to 4K, 1K default]
MA End Points [MEP] Supported	Per MA + MD Level
MA Intermediate Points [MIP] Supported	Per MA + MD Level
Continuity Check Messages [CCM]:	
- Initiate CCM	Yes
- CCM Supported Rates	7 standard rates
- Rate Limit per Port	Yes
- Loss of Continuity Event	Yes
Loopback [LB]	
- Route to Control Stack	Yes
- Initiate LB Messages [LBM]	Yes
- Reply to LB Messages [LBR]	Yes
Link Trace [LT]	
- Route to Control Stack	Yes
- Initiate LB Messages [LBM]	Yes
- Reply to LB Messages [LBR]	Yes

Performance Monitoring:

Performance Monitoring [PM - defined in ITU-T Y.1731] adds performance monitoring functionality to CFM to allow SLA verification.

The main features of PM are:

- Frame loss measurement
- Frame delay and delay variation measurement
- Alarm Indication Signal [AIS] – avoids cascading of alarms throughout the network
- Transport of Maintenance Communication Channel and Vendor Specific frames

Technical Specification [PM - Loss Measurement]

Enable per remote MEP	Yes
Loss Measurement Messages [LMM] : <ul style="list-style-type: none">- Initiate LMMs- Single Ended- Dual Ended- Supported Rates- Auto Reply [LMR]	Yes Yes Future release All CCM rates Yes
Statistics <ul style="list-style-type: none">- Near End- Far End	Yes Yes

Technical Specification [PM - Delay Measurement]

Delay Measurement [DM]: <ul style="list-style-type: none">- Initiate Eth-DMs- 1-Way [1DM]- 2-Way [Round Trip]- Supported Rates- Auto Reply [DMR]	Yes Yes Yes All CCM rates Yes
Timestamp Source <ul style="list-style-type: none">- Free-running Clock- Synchronized to an External Clock	Yes Yes

Link OAM:

Link OAM [defined in IEEE 802.3ah] is used for point-to-point Ethernet management, notably in emerging Ethernet in the First Mile [EFM] deployments. The principal functions of Link OAM are:

- Discovery of peer EOAM capabilities
- Critical event detection
- Wire-speed data loopback
- Remote variable retrieval
- Link event reporting

Technical Specification [Link OAM]

Discovery State Machine	Yes
DTE mode	Active or Passive
Critical Events: <ul style="list-style-type: none">- Link Fault- Dying Gasp- Critical Event	Yes Yes Yes
Variable Retrieval	Request and Response
Remote Loopback	Request and Response
Link Monitoring <ul style="list-style-type: none">- Errored Symbol Period- Errored Frame- Errored Frame Period- Errored Frame Seconds Summary	Yes Yes Yes Yes

Contact Information:

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